LAWRENCEBURG OXBOW LAKE (IN-91)

1.0 Location

The proposed Lawrenceburg Oxbow Lake Restoration project is located in Dearborn County, Indiana. The project area is due south of the town of Hardinsburg, Indiana and approximately 3 miles northeast of Lawrenceburg, Indiana. The oxbow lake is in the floodplains of the Ohio and Great Miami Rivers just northwest of the confluence of these rivers, near Ohio River mile 492. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Lawrenceburg Oxbow Aerial View

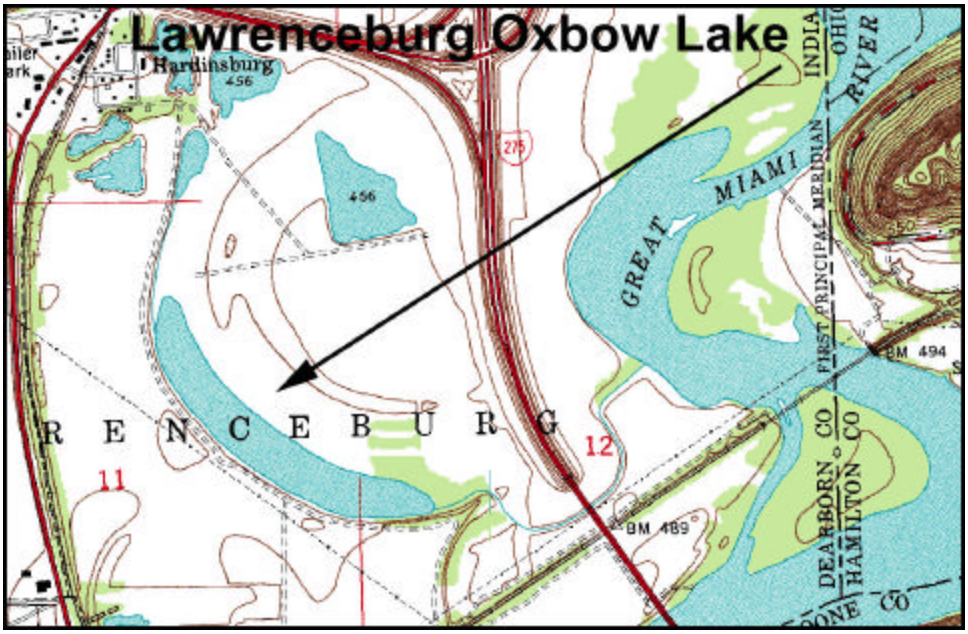
2.0 Project Goal, Description, and Rationale

The primary goals of the Lawrenceburg Oxbow Restoration project include restoration of the existing oxbow to enhance backwater fish and wildlife habitat. The restoration of backwater areas will provide reproductive, feeding, nursery, high water refuge, seasonal migration, and overwintering habitat for many fish species. The project involves dredging 50% of the surface area to an average depth of 12 feet at the USACE normal pool level.

The Lawrenceburg Oxbow is one of a few large Ohio River floodplain oxbow lakes remaining in the State of Indiana. Oxbow lakes, which are cut-off from the river except during periods of high river stage, are important spawning, nursery and feeding areas for riverine fishes. Oxbow lakes also provide important habitat for migratory waterfowl, wading birds and other wildlife.

Historically, oxbow lakes, due to their cut-off nature and location within river floodplains, slowly fill in with sediments. Today, the rate of sedimentation or filling of these oxbow lakes is accelerated due primarily to the clearing of the Ohio River floodplain for agricultural production, which replaced naturally occurring wetlands and bottomland hardwoods with seasonally vegetated croplands. Large oxbow lakes are unique areas that the State of Indiana wishes to protect and restore as functioning aquatic ecosystems.

3.0 Existing Conditions



Lawrenceburg Oxbow is located adjacent to the Ohio River and within the Ohio River / Great Miami River floodplain. Lawrenceburg Oxbow appears to be the old channel of the Great Miami River. A high stream terrace surrounds portions of the eastern side of the project area. The oxbow is situated in a topographic setting that allows continuity with the Ohio River and/or the Great Miami River only during periods of high river stage. A borrow pit north of the lake has expanded and is directly connected to the lake.

Agriculture at Lawrenceburg Oxbow

Terrestrial/Riparian Habitat: Lawrenceburg Oxbow is surrounded by agricultural fields. A narrow band of forest is present around the oxbow and around the small ditches connecting the oxbow to the Ohio and Great Miami Rivers. Mature silver maples (*Acer saccharinum*) are common along the high stream terrace east of the oxbow. Young silver maples are common along the channel to the Great Miami River.

Wading birds (e.g. great blue heron),waterfowl (e.g. wood duck), and beavers are found in the Lawrenceburg Oxbow.

Silver maples along Ditch

Riparian Forest near Oxbow

Aquatic Habitats: The Lawrenceburg Oxbow has a variety of aquatic habitats ranging from deep open water areas to shallow water areas. Shallow water habitats include areas with aquatic vegetation as well as shallow mud flat areas. Although large portions of the oxbow contain shallow water emergent vegetation (e.g. smartweed) major portions of the oxbow have retained open water habitat. It is presumed that the open water areas of the oxbow contain deep water (5 or more feet deep). Some stumps and fallen trees provide some woody structure within the oxbow. Duckweed (*Lemna* sp.) is common in the ditches and is also present in lower densities in the oxbow.

It is expected that the Lawrenceburg Oxbow provides seasonally available backwater spawning habitat for Ohio River fishes and serves as a nursery area for young of the year fishes. The deeper water areas in the oxbow appear to provide permanent aquatic habitat for fishes.

Oxbow Open Water Habitat

Oxbow Shallow Water Habitat

Oxbow Ditch at Great Miami River

Wetlands: Jurisdictional wetlands are present at the Lawrenceburg Oxbow site. Three types of wetlands are common around the oxbow in the project area. Extensive shallow water emergent wetlands are present along much of the edge of the oxbow. These wetlands are comprised predominantly of smartweed. Scrub shrub wetlands are present at slightly higher elevations and are comprised primarily of buttonbush, black willow and silver maple. Bottomland hardwood wetlands are located near the ditches and along the eastern portion of the project site.

Willows and Emergent Vegetation

Oxbow Emergent Wetland

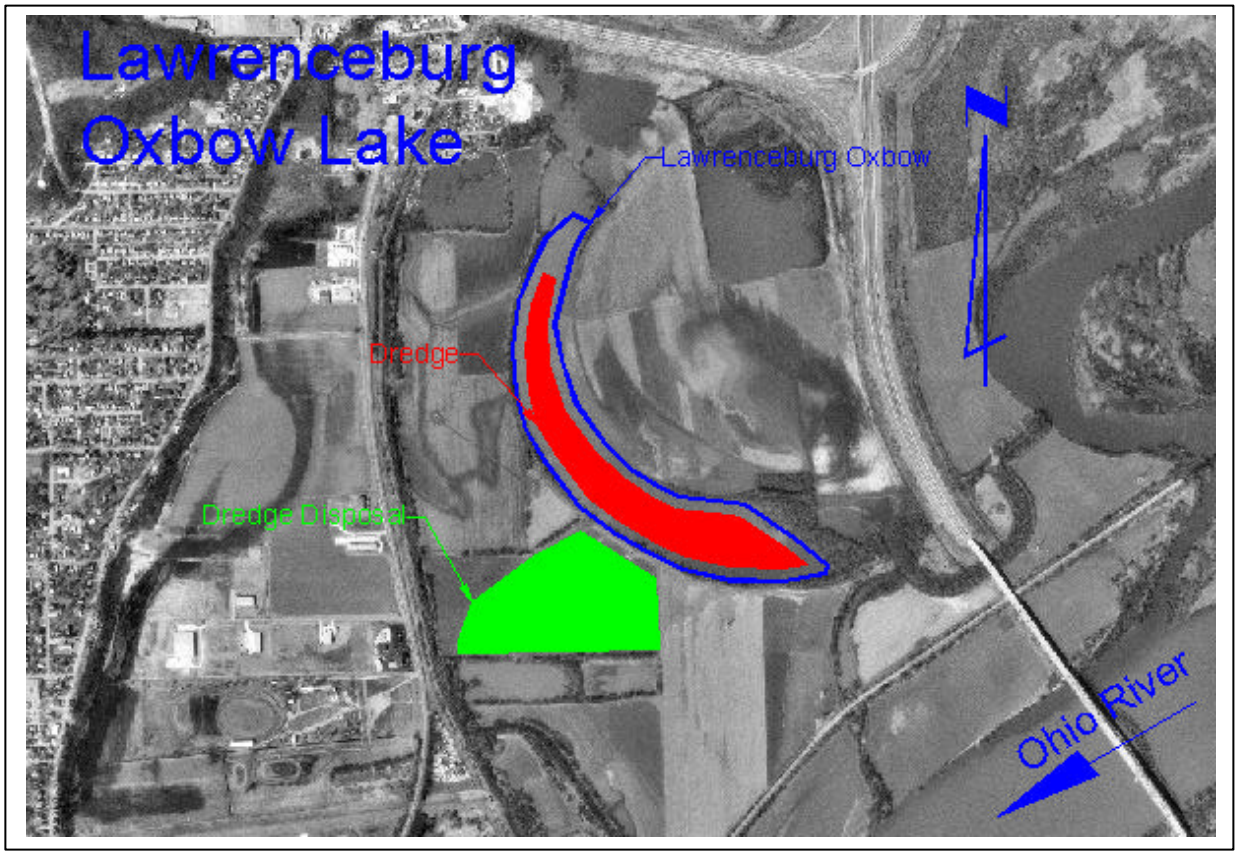
Bottomland Forest Wetland

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 2 federally-listed endangered species known to occur in Dearborn County, Indiana. They are the interior least tern (*Sterna antillarum athalassos*) and running buffalo clover (*Trifolium stoloniferum*).

The interior least tern is typically associated with large river systems. Open sandbar habitats are used as nesting/brood rearing habitat and shallow water areas are used for feeding. There does not appear to be suitable tern habitat near the project area.

Running buffalo clover is a species most commonly associated with the ecotone between open forest and prairie. It is unlikely that running buffalo clover exists in the project area.

4.0 Project Diagram



5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

Lawerenceburg Oxbow is one of a few large Ohio River oxbow lakes remaining in the State of Indiana. Lawerenceburg Oxbow is slowly filling in with sediments. The State of Indiana wishes to protect and restore this unique aquatic ecosystem.

5.2 Lawerenceburg Oxbow Dredging

Maintenance dredging of Lawerenceburg Oxbow is required to provide deep water habitat, and to extend the life of the historic oxbow. An estimated 324,200 cubic yards of silty-clay material would be dredged to restore depths of 4-12 feet. The outer limits of dredging would occur approximately 100 feet inside of the open basin area of Lawerenceburg Oxbow (approximately 33-acres of the 64-acre open basin will be dredged). Depths at this distance are currently estimated to range from 3-4 feet. Dredging would begin at this location and would descend at a 10:1 slope to depths of 12 feet. A dredge disposal site is located adjacent to the lake. A small levee, 6 feet high, and 870 feet in length would be constructed at the designated disposal sites for dewatering.

5.3 Planning/Engineering Assumptions

- A small auger head dredge would be used, and the material would be pumped directly to the disposal site.

- Bottom side slopes will be reshaped to a 10:1.
- All the material required for the levee would be taken from on site.
- Four 2,320 gallons per minute (gpm) centrifugal pumps would be used for dewatering.

6.0 Cost Estimate (Construction)

Dredging - Engineering costs for the proposed project are contained on Table 1. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 1. Engineering Costs.

Item	Cost
Dredging	$305,000
Levee	$33,200
Dewatering	$178,900
Mobilization	$15,200
TOTAL	**$532,300**

7.0 Schedule

Lawerenceburg Oxbow Dredging: The estimated construction time for this project is shown on Table 2.

Table 2. Construction Schedule.

Item	Time
Dredging	337 Days
Levee	22 Days
Dewatering	250 Days
Mobilization	4 Days
TOTAL	**613 Days**

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: The impacts of restoring/dredging the oxbow lake would primarily be in-stream. There would be no foreseeable beneficial impacts to terrestrial or riparian resources as a result of implementing the proposed project.

Aquatic Habitats: Long term beneficial impacts to aquatic resources would be expected as a result of implementing the proposed project. Dredging of the project areas would result in beneficial impacts to fishes due to the deepened oxbow. The oxbows life span would increase. The oxbow habitat would could serve as feeding, nursery, high water refuge, or overwintering habitat for many riverine fish species.

Wetlands: There would be no reasonably foreseeable beneficial impacts to wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no reasonably foreseeable beneficial impacts to the federally-listed, endangered interior least tern or running buffalo clover as a result of implementing the proposed project.

Socioeconomic Resources: There would be minor short-term and long-term beneficial impacts to socioeconomic resources as a result of implementing the proposed project. The

short-term beneficial impacts would be related to costs and local expenditures associated with the construction/dredging of the embayment. Long-term socioeconomic benefits would be realized through improved recreational fishing opportunities. Long-term indirect beneficial impacts will be realized through local expenditures for fishing tackle, food, gas, and other associated needs.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be short term adverse impacts to terrestrial and riparian species as a result of implementing the proposed project. Construction related noise and activities could result in increased wildlife disturbance near the project area.

Short-term impacts would also occur associated with the disposal of the dredge material on the adjacent agricultural lands. Adverse impacts to this area would be considered short term, because it is assumed that the site can be farmed following the dewatering and grading of the dredge material.

Aquatic Habitats: There would be potential short term adverse impacts to sensitive aquatic species as a result of implementing the proposed project. Aquatic species, primarily macroinvertebrates, within the sediments and vegetation of Lawrenceburg Oxbow would be adversely impacted by removal from the oxbow and/or increased water turbidity associated with the dredging operations.

Wetlands: Long-term adverse impacts to jurisdictional wetlands in the vicinity of Lawrenceburg Oxbow would occur. The proposed project entails dredging only the aquatic portions of the oxbow and not the immediate shoreline area. However some of the area to be dredged and converted into deep water aquatic habitat contains shallow water emergent vegetation that appears to be jurisdictional. Additionally, portions of the shoreline wetlands may be adversely impacted indirectly during the dredging process.

The removal of the smartweed wetland habitat would be considered adverse to a variety of wetland oriented wildlife. Species that are likely to be adversely impacted would include waterfowl, wading birds; and shorebirds.

Federally-Listed Threatened and Endangered Species: There would be no reasonably foreseeable adverse impacts to the federally-listed, endangered interior least tern or running buffalo clover as a result of implementing the proposed project. The project area does not provide suitable tern habitat, and there does not appear to be any suitable tern habitat in the rivers near the project area.

Socioeconomic Resources: There would be short-term adverse impacts associated with the temporary loss of farming at the dredge material disposal sites. These impacts would be short term because it is assumed that the disposal area can be farmed following the completion of the dredge material dewatering.

10.0 Mitigation

Minor impacts associated with site restoration may occur during the construction of this project, however, no significant adverse impacts are expected. The use of best management practices and proper construction techniques would minimize adverse water quality impacts.

Portions of the emergent wetlands that populate major segments of the Lawrence Oxbow will be eliminated during the dredging operations in the oxbow. These wetlands will be replaced by deepwater aquatic habitat that will prolong the life span of the oxbow. Adverse impacts to

jurisdictional wetlands may require in-kind mitigation. A jurisdictional wetland determination by USACE is recommended for this site. Mitigation alternatives should be determined by joint consensus of Indiana DNR, USACE, and USFWS.

11.0 Preliminary Operation and Maintenance Costs: Operation and Maintenance costs are summarized on Table 3.

Table 3. Operation and Maintenance Costs

Maintenance	Frequency	Costs
Maintenance Dredging	25 years	$54,000

12.0 Potential Cost Share Sponsor(s)

- Indiana Department of Natural Resources
- The Nature Conservancy
- Ducks Unlimited
- Local Government
- County Government
- Local Economic Development Council
- Indiana Bass Federation
- Local BASS chapters
- Private corporations
- Local marinas

13.0 Expected Life of the Project

It is anticipated that the dredging operation would provide meaningful depths for fishes for approximately 25-30 years before additional dredging would be necessary.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings.

The project involves habitat restoration of the Lawrenceburg Oxbow Lake located about 0.5 miles west of the mouth of the Miami River at Ohio River mile 491. The Indiana towns of Lawrenceburg, Greendale and Homestead in Dearborn County are within one mile west of the oxbow lake.

The following environmental conditions were considered when conducting the June 17, 1999 project area inspection:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other.

A pipe with a culvert extends from the oxbow lake to the Ohio River. Dearborn Gravel has a dredging operation near the project area. Aside from the pipe/culvert and Dearborn Gravel operation, none of the other environmental conditions listed above were observed on the project area.

15.0 Property Ownership & River Access

Selected data on properties immediately adjacent to or within each concept site was collected from the county courthouse of the respective county of each site. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area which identified each parcel with a corresponding map and parcel number. The map\parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office. Plat\parcel maps were collected for each site.

The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used in each State for taxation purposes. These assessed values reflect 1998 assessments. The assessed valuation ratio is 33.3 percent for Indiana.

The above ratios were used to approximate the market value of each property. However, in many instances the resultant market value calculated under the above procedure is considerably below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.

The collected property data indicate that private lands are adjacent to the Lawrenceburg Oxbow Lake project area. Private lands will be needed and/or disturbed for this project. The disposal of dredge material will be on private property. The majority of the property under consideration is in private ownership, therefore easements or other agreements will need to be made prior to further progress.

Table 5. Property Characteristics

Site Name: Lawrenceburg Oxbow Lake
Location: Dearborn County, Indiana

Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
7-02/052	Huntington Machinery & Equipment Rental	P.O. Box 147 Huntington, IN 47542	$ 9,000	20.6
7-02/056 -02/057 -02/058 -02/059 -02/060 -02/061 -02/062	Dearborn Gravel Co., Inc	17250 Main St. – Hardintown Lawrenceburg, IN 47025	$ 4,000	(small lots)
7-02/083 -02/084 -02/085 -02/086 -02/087 -02/088	Sallie Hayes	332 Schnebelt St. Lawrenceburg, IN 47025	$ 1,300	(small lots)

Table 5. Property Characteristics

Site Name: Lawrenceburg Oxbow Lake
Location: Dearborn County, Indiana

Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
7-02/090	Oxbow of Indiana, Inc	C/o Mark Westirch 23542 Maple Ridge Drive Lawrenceburg, IN 47025	$ 1,500	?
7-02/091	Ralph & Mary Clark	1505 Water St.-Hardington Lawrenceburg, IN 47025	$ 1,900	3.85
7-02/093,089	Ralph & Mary Clark	1505 Water St.-Hardington Lawrenceburg, IN 47025	$ 4,000	?
7-02/094	Oxbow of Indiana, Inc.	C/o Mark Westirch 23542 Maple Ridge Drive Lawrenceburg, IN 47025	(included in parcel 7-02/090)	?
7-02-402/012	(?)			
7-02-402/017	(?)			
7-02-402/016 -02-402/022 -02-402/029 -02-402/035 -02-402/040 -02/402/045	Dearborn Gravel Co., Inc.	(see above)	$ 150,000	7.61
7-11/004	Oxbow of Indiana	C/o John Getzendanner 20987 Crestview Drive HVL Lawrenceburg, IN 47025	$ 6,900	24.18
7-11/004.900	Oxbow of Indiana	C/o David Styer 16 Brandywine Drive Cincinnati. OH 45246	?	3.66
7-11/005	Jacob & Mildred Hayes	332 Schebelt St. Lawrenceburg, IN 47025	$ 2,200	10.69
7-11/010	Oxbow of Indiana	P.O. Box 43371 Cincinnati, OH 45243	$ 5,400	27.21
7-11/010.900	Oxbow of Indiana	P.O. Box 43371 Cincinnati, OH 45243	$ 5,400	27.21
7-11/013	Vera Evans	10956 Mockernut Drive Harrison, OH 45030	$ 20,300	71.50
7-11/018	Oxbow of Indiana	C/o Mark Westirch 23542 Maple Ridge Drive Lawrenceburg, IN 47025	$ 30,900	108.30
7-11/018.900	Oxbow of Indiana	C/o Mark Westirch 23542 Maple Ridge Drive Lawrenceburg, IN 47025	$ 4,400	18.31
7-12/007	I-275 Enterprises, Inc.	119 Walnut Street Lawrenceburg, IN 47025	(?)	(?)
7-12/010	B & O Railroad	(?)	-	(?)
7-12/011	I-275 Enterprises, Inc.	(see above)	$ 6,000	22.35
7-12/012	(?) either Oxbow of Indiana, or a Jennison Guard)		(?)	(?)
7-12/012.001	Oxbow of Indiana	C/o Mark Westrich (see above)	$ 3,400	13.64

Table 5. Property Characteristics

Site Name: Lawrenceburg Oxbow Lake
Location: Dearborn County, Indiana

Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
7-12/012.900	Oxbow of Indiana	C/o Mark Westrich (see above)	(?)	12.20
7-12/013.900	Oxbow of Indiana	C/o Jim Rettig 7245 Rita Lane Cincinnati, OH 45243	(?)	3.16
7-12/014	Oxbow of Indiana	C/o John Getzendanner 20987 Crestview Drive HVL Lawrenceburg, IN 47025	$ 2,400	8.97
7-12/014.900	Oxbow of Indiana	C/o David Styer 16 Brandywine Drive Cincinnati. OH 45246	$ 3,700	13.55
7-12/020	Michael & Constance Sedler	24067 Jeb Drive Lawrenceburg, IN 47025	$ 3,500	6.09
7-12/021	Donald Bernard	6440 Upper Road Cincinnati, OH 45233	$ 1,400	5.40
7-12/025.900	Oxbow of Indiana	C/o David Styer 16 Brandywine Drive Cincinnati. OH 4524	(?)	10.57

* Denotes improvements on property.

16.0 References

Scott, 1989	Scott, M.T. and L.A. Nielson. 1989. Young fish distribution in backwaters and main-channel borders of the Kanawha River, West Virginia. Journal of Fisheries Biology No. 35 (Supplement A) pp. 21-27.
Sheaffer, 1986	Sheaffer, W.A. and J.G. Nickum. 1986. Backwater areas as nursery habitats for fishes in Pool 13 of the Upper Mississippi River. Hydrobiology No. 136 pp. 131-140.
Sheehan, 1994	Sheehan, R.J., W.M. Lewis, and L.R. Bodensteiner. 1994. Winter habitat requirements and overwintering of riverine fishes. Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois. Final Report F-79-R-6.
USFWS, 1999	U.S. Fish and Wildlife Service, July 1, 1999. Federally Listed Endangered and Threatened Species in Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist

Project Site Location:

The proposed Lawrenceburg Oxbow Lake Restoration project is located in Dearborn County, Indiana. The project area is due south of the town of Hardinsburg, Indiana and approximately 3 miles northeast of Lawrenceburg, Indiana. The oxbow lake is in the floodplains of the Ohio and Great Miami Rivers just northwest of the confluence of these rivers, near Ohio River mile 492. The project site is within the jurisdiction of the USACE Louisville District.

Description of Plan selected:

Lawrenceburg Oxbow is one of a few large Ohio River floodplain oxbow lakes remaining in the State of Indiana. Oxbow lakes, which are cut-off from the river except during periods of high river stage, are important spawning, nursery and feeding areas for riverine fishes. Oxbow lakes also provide important habitat for migratory waterfowl, wading birds and other wildlife. The primary goals of the Lawrenceburg Oxbow Restoration project include restoration of the existing oxbow to enhance backwater fish and wildlife habitat. The restoration of backwater areas will provide reproductive, feeding, nursery, high water refuge, seasonal migration, and overwintering habitat for many fish species. The project involves dredging 50% of the surface area to an average depth of 12 feet at the USACE normal pool level.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? **Yes** **Reduce the amount of dredging.**

Larger Size Plan Possible? **No**

Other alternatives? **No**

Restore/Enhance/Protect Terrestrial Habitats? No **Objective numbers met**

Restore, Enhance, & Protect Wetlands? No **Objective numbers met**

Restore/Enhance/Protect Aquatic Habitats? Yes **Objective numbers met** A1

Type species benefited: Multiple Ohio River fish species.

Endangered species benefited: None

Can estimated amount of habitat units be determined: Approximately 33 acres of oxbow habitat will be restored

Plan acceptable to Resources Agencies?
U.S. Fish & Wildlife Service?
State Department of Natural Resources? Yes – Indiana DNR

Plan considered complete? **Connected to other plans for restoration?**

Real Estate owned by State Agency? No **Federal Agency?** No
Real Estate privately owned? Yes
If privately owned, what is status of future acquisition Acquisition, agreements, or easements will be required.

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

Restoration provides valuable fish habitat in the form of increased deep-water habitat diversity, spawning habitat, over-wintering habitat, and deep-water winter velocity shelters.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?
Yes / No
Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____
Non-government Entity _____

Corps Contractor _____Date_____

U.S. Fish & Wildlife Representative _____Date_____

State Agency Representative _____Date _____

U.S. Army Corps of Engineers Representative _____Date _____

Terrestrial Habitat Objectives

T1 Riparian Corridors

T2 Islands

T3 Floodplains

T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

W1 Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands

W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)

A2 Riverine submerged and aquatic vegetation

A3 Sand and gravel bars

A4 Riffles/Runs (tailwaters)

A5 Pools (deep water, slow velocity, soft substrate)

A6 Side Channel/Back Channel Habitat

A7 Fish Passage

A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)